Mathematics Grade 5

Mathematics is used as a means to communicate about quantities, logical relationships, and unknowns. Such a simplistic statement may make students who are not planning to go to college ask why mathematics is necessary for them. While the ability to do computation is important, it is the skills of problem finding and problem solving along with developing abstract thinking, symbolic representation and interpretation, logical arguments, and objective reasoning that allow us to function effectively and understand our world.

Mathematics is the one area of coursework in the school curriculum where students are taught these skills, and where answers cannot be obtained just by common sense and guessing. Even without an ever-increasing reliance on technology, mathematical skills meet needs for practical everyday life, intelligent citizenship, and future employment. A study by Arizona State University indicated that students who opt out of advanced levels of mathematics and science may now eliminate up to 75% of career opportunities from which to choose[†]. Algebra has been called the academic passport for passage into virtually every facet of the job market. Employers want their employees to be able to set up problems, estimate solutions, identify how accurate solutions need to be, work with other people to reach goals, know the many different types of mathematics that exist, and determine which one is needed in a particular situation. It is clear that the mathematical literacy of the twentieth century will **not** be sufficient for the twenty-first century.

[†]*ASU Research* Fall 1998, p. 41

About the Test

The AIMS DPA Mathematics test contains approximately 80 multiple-choice questions. Fifty-five of the items are AIMS questions. Fifteen items are *TerraNova* and AIMS questions, and 10 items are *TerraNova* questions. Calculators are not allowed; however, the calculations required can be readily handled with pencil and paper. The questions will emphasize conceptual understanding, process, and problem-solving skills rather than just computation skills.

Hints for taking AIMS DPA Mathematics

- Remember, this is not a timed test. Take your time and do your best work.

- Check to see if your answer is reasonable.

- Since calculators are not allowed on this test, double-check your work!

- Answer all items.

Sample Questions for Mathematics

## What To Expect From This Section

     This AIMS DPA Student Guide for Mathematics provides examples of the format and types of questions that will appear on AIMS Mathematics. An attempt has been made to provide a sampling of the types of questions that might be asked; however, not every concept in each strand has a corresponding sample question in this guide. An answer key for all mathematics sample questions is provided in the appendices. Additionally, you will find an AIMS DPA Mathematics Reference Sheet in the appendices. The reference sheet in the actual AIMS DPA Mathematics test will be revised to reflect on the formulas and other information that will be included on the test.

Strand 1: Number Sense and Operations

General concepts you should know:
- Proficiency with the operations of addition, subtraction, multiplication, and division, including their inverse relationships.
- Evaluate reasonableness of results using a variety of techniques, including mental math.
- Compare and order whole numbers, common fractions, decimals, and rational numbers.
- Equivalent forms of numbers.
- Factorization of whole numbers.
- Proficiency with simple graphs.

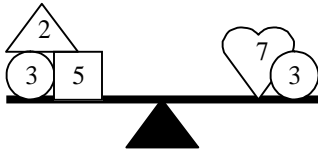**1** What improper fraction does this model represent?
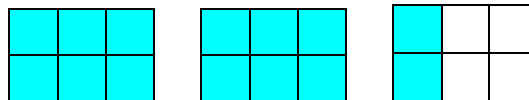
A $2\dfrac{6}{14}$

B $\dfrac{14}{6}$

C $\dfrac{14}{4}$

D $\dfrac{6}{14}$

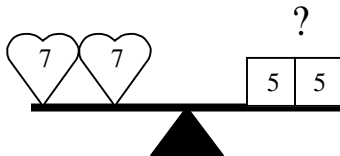**2** Which of the following lists the numbers below in order from greatest to least?

$$3.96,\ \frac{12}{6},\ 3\frac{3}{4},\ 4.0$$

A $4.0,\ 3\dfrac{3}{4},\ 3.96,\ \dfrac{12}{6}$

B $\dfrac{12}{6},\ 3\dfrac{3}{4},\ 3.96,\ 4.0$

C $\dfrac{12}{6},\ 3\dfrac{3}{4},\ 4.0,\ 3.96$

D $4.0,\ 3.96,\ 3\dfrac{3}{4},\ \dfrac{12}{6}$

3 The scale below is balanced.

Which other shapes are needed on the right side of the scale below to make it balance?

A (3) [5]

B /2\ (3)

C /2\ /2\

D (3)(3)

4 Which of the following equations is correct?

A $4 \times [(7 \times 1)(4 - 2)] = 168$

B $4 \times [(7 \times 1)(4 - 2)] = 110$

C $4 \times [(7 \times 1)(4 - 2)] = 104$

D $4 \times [(7 \times 1)(4 - 2)] = 56$

5 Tom was building a frame for a painting. The painting was 32 inches long and 24 inches wide. Approximately how long of a piece of wood did Tom need to build the frame?

A 56 inches

B 120 inches

C 240 inches

D 780 inches

Strand 2: Data Analysis, Probability, and Discrete Math

General concepts you should know:
- Construct charts, tables and plots using the appropriate graphical format to present the data (for instance, bar, circle, and line graphs; frequency tables, Venn diagrams).
- Compare results of an investigation with a given prediction.
- Measures of central tendency (mean, median, mode).
- Counting strategies, outcome sets, probability.
- Probability/outcomes of simple events.

6 Omar is going to San Diego. He packed 3 sweatshirts and 2 pair of shorts. How many different combinations of one sweatshirt and one pair of shorts can he make?

A 9

B 6

C 5

D 4

Mark and Juan entered the amount of time they spent doing homework each day into the table below.

Time Spent on Homework (in hours)

	Mark	Juan
Monday	1	1 ½
Tuesday	½	½
Wednesday	2	2
Thursday	1 ½	½
Friday	½	0

7 Which graph accurately represents the information in the table?

A

C

B

D
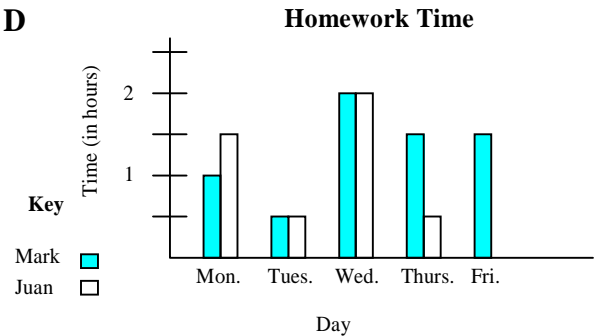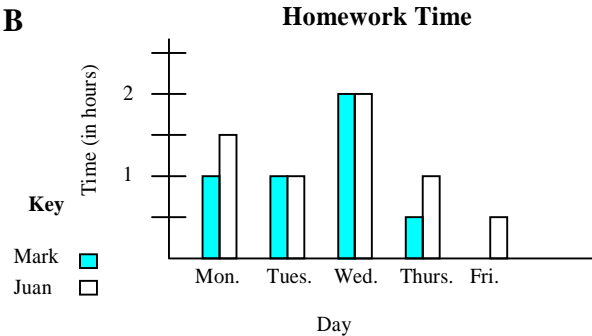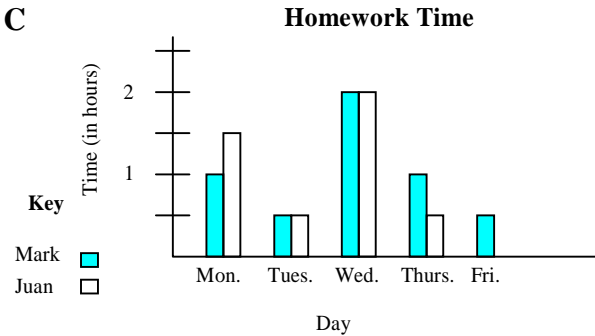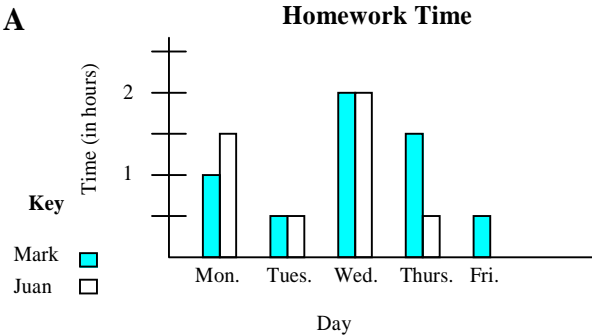
Sue flipped a fair coin 25 times and recorded her results in the table below.

Sue's Experiment Results

	Heads	Tails
Experiment #1	12	13
Experiment #2	9	16

8 Sue conducted the experiment twice. Based on her results, which of the following statements could be true?

A The coin landed on heads more often in one experiment only.

B The coin landed on tails more often in one experiment only.

C The coin landed on tails more often in both experiments.

D The coin landed on heads more often in both experiments.

9 Vincent is coloring the artwork below for his Art Club's T-shirts.
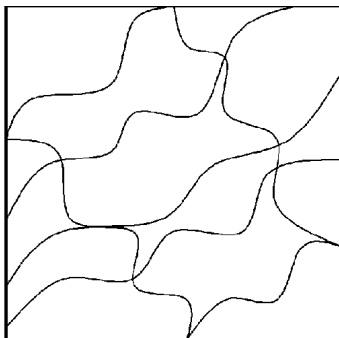
Vincent knows that no two like colors can touch along an edge. What is the **least** number of colors Vincent can use?

A 2

B 3

C 4

D 5

Strand 3: Patterns, Algebra, and Functions

General concepts you should know:
- Simple geometric and number patterns.
- Describe a rule for patterns.
- "Output" from a given "input."
- Solve simple equations.
- Graph given data points (whole numbers).

Nick used an addition rule to make the number pattern below, but forgot one of the numbers.

2, 14, ___, 38, 50, 62

10 What number did Nick forget?

A 24

B 26

C 28

D 30

Bryan used the same rule to change each number in Column A to a different number in Column B.

Column A		Column B
7		12
9		14
11		16
13		18

11 Which of the following could be the rule Bryan used?

A subtract 2 from the number

B add 2 to the number

C subtract 5 from the number

D add 5 to the number

12 The cost of one mini-skateboard is $2. Which number sentence could be used to determine the cost, *M*, of 5 mini-skateboards?

    A $\$2 + 5 = M$

    B $5 - \$2 = M$

    C $5 \div \$2 = M$

    D $\$2 \times 5 = M$

Lupita went to a shoe sale. The chart below shows the sale prices.

Pairs of Shoes	1	2	3	4
Total Cost	$10	$18	$24	$28

13 Which of the following statements could describe the shoe sale?
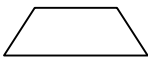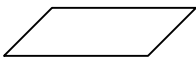
    A The price per pair of shoes decreases with each additional pair of shoes.

    B The price per pair of shoes increases with each additional pair of shoes.

    C The price per pair of shoes stays the same with each additional pair of shoes.

    D The price per pair of shoes decreases by $2 with each additional pair of shoes.

Strand 4: Geometry and Measurement

General concepts you should know:
- Properties of simple two- and three-dimensional geometric figures, including how to draw two-dimensional figures.
- Basic geometric relationships such as similarity, congruence, angle measure, parallelism and perpendicularity, symmetry.
- Transformations (turns, flips, slides)
- Solve problems with given formulas (area and perimeter).
- U.S. customary and metric units and conversion within each.

- Selection of appropriate measuring tool.
- Appropriate degree of accuracy to solve problems.
- Distance, perimeter, area, weight.
- Calculate area and perimeter of polygons using given formulas.
- Effect on perimeter and area when one dimension of an object is altered.

14 Which of these appears to have 2 sets of parallel lines, 2 obtuse angles, and 2 acute angles?
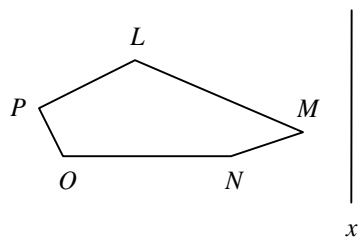
    A

    B

    C

    D

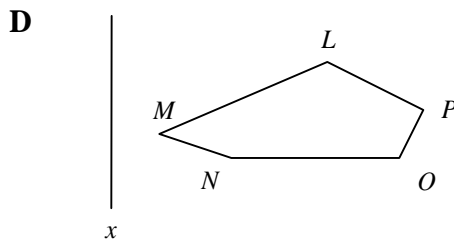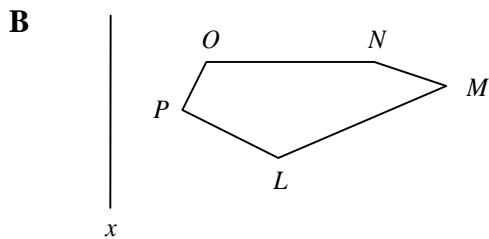**15** What is the measure of angle *x* in the triangle below?

x

135°

20°
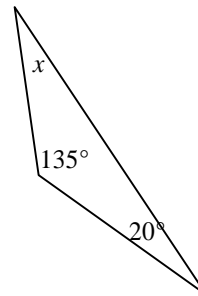
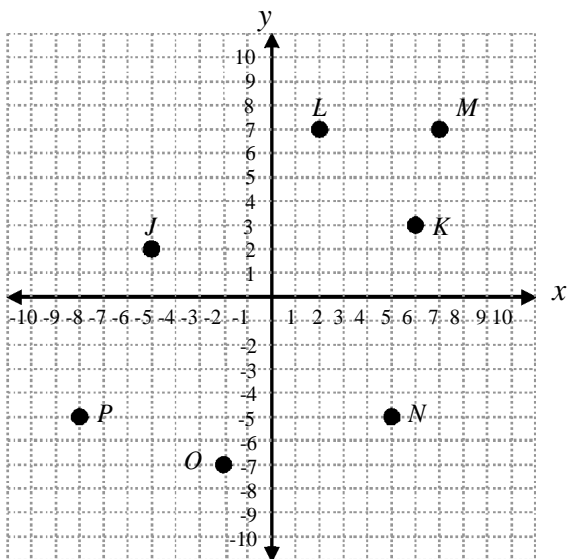   **A** 155°

    B 115°

    C 25°

    D 20°

Figure A is shown in the diagram below.

16 Which of the following appears to be a reflection of figure A across the line x?

A

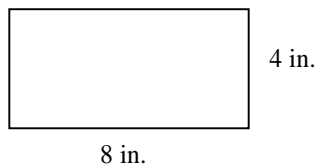
C

B

D
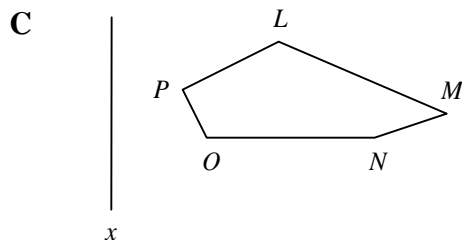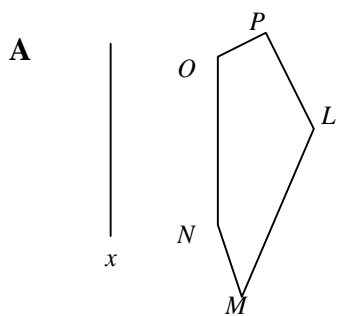
17 Which of the following points appears to be at (2, 7) on the coordinate grid below?

A *L*

B *M*

C *N*

D *O*

18 What is the area of the rectangle shown below?
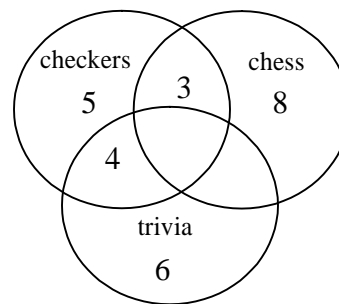

4 in.

8 in.

A 12 square inches

B 24 square inches

C 32 square inches

D 64 square inches

Strand 5: Structure and Logic

General concepts you should know:
- Design simple algorithms.
- Identify necessary and unnecessary information.
- Identify simple, valid arguments.

Tulu asked her friends about the games they like and displayed the results in the Venn diagram below.

19 According to the Venn diagram, which statement must be true about her friend Gordon?

A If Gordon likes chess, then he does **not** like checkers.

B If Gordon likes checkers, then he does **not** like trivia.

C If Gordon likes chess, then he does **not** like trivia.

D If Gordon likes trivia, then he does **not** like any other game.

Scoring Key

Mathematics Key

Question #1: B
Question #2: D
Question #3: C
Question #4: A
Question #5: B
Question #6: B
Question #7: A
Question #8: C
Question #9:   B
Question #10: B
Question #11: D
Question#12: D
Question #13: A
Question #14: B
Question #15: C
Question #16: D
Question #17: A
Question #18: C
Question #19   C